SOIL MANAGEMENT GUIDELINES

FOR

EROSION CONTROL

IN

AGRO - MANITOBA

SOIL MANAGEMENT GUIDELINES FOR EROSION CONTROL IN AGRO-MANITOBA

I. INTRODUCTION

Retaining crop residues on the surface of the soil is the single most effective and practical means of controlling erosion. The amount of residue required for soil protection depends on the erodibility of the soil.

Tillage has a direct influence on the amount of crop residue left on the soil surface. Each tillage operation buries crop residues, the amount varying according to the tillage implement used.

Some crops (such as potatoes and pulses) do not produce enough residue for effective erosion control. Other practices must be utilized on soils left unprotected after harvest.

II. GENERAL GUIDELINES FOR EROSION CONTROL

Soils vary according to their susceptibility to erosion. Erosion risk maps for Agro-Manitoba have been prepared based upon climatic and soil conditions and assuming no vegetation cover (maps 1-4).

The erosion potential maps indicate the degree of risk in terms of three categories of wind erosion (moderate, high, and very high) (map 3) and four categories of water erosion (slight, moderate, high, and very high) (map 4). These categories were developed by applying the Wind Erosion Equation and Universal Soil Loss Equation for Water, using soil characteristics appropriate for the 1:125,000 mapping scale.

Continuous cropping should be practised on soils with slight, moderate, and high risk (no summerfallow in crop rotation). On soils having a very high risk for erosion annual crops should generally not be grown. Such soils should primarily be used for perennial forage production or be retained in native vegetation. Native forages should be protected from overgrazing. Grazing should be according to rates established for such soils.

On soils other than those categorized as very high risk, residue management is generally the preferred method of soil erosion control.

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Crop residues should be distributed evenly over the soil with the use of combine straw choppers, chaff spreaders and harrowing operations. Tillage should be performed so as to maintain adequate ground cover over the fall, winter and spring seasons. Post-emergent herbicides for weed control should be utilized whenever incorporation of pre-emergence herbicides would lead to insufficient surface residue for soil protection.

Special crops, such as sugar beets, potatoes, lentils, peas and field beans provide limited quantities of plant residue at harvest. Tillage of such fields creates conditions similar to summerfallow. Consequently, the time period between harvest and establishment of a crop canopy the next growing season can leave fields extremely susceptible to erosion. Residue management and reduced tillage practices are not adequate for soil erosion control under special crops. Other soil conservation practices must be employed.

III. TILLAGE GUIDELINES FOR EROSION CONTROL-HIGH AND LOW RESIDUE CROPS

These tillage guidelines, if followed, provide adequate groundcover from harvest to seeding the following year.

1. Soils With Slight to Moderate Erosion Risk

- Table 1 provides tillage guidelines for various crops and yield conditions based on achieving a target of approximately 50 percent groundcover at time of seeding.

2. Soils With High Erosion Risk

- Table 2 provides tillage guidelines for various crops based on achieving a target of approximately 65 percent groundcover. On high risk soils, due to coarser soil textures or steeper slopes, more groundcover is required for erosion protection.

IV. CONSERVATION PRACTICES FOR SPECIAL CROP PRODUCTION

Special crops, regardless of yield, produce insufficient residues for soil protection. One or more of the following soil conservation practices should be implemented:

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1. Fall Seeded Cover Crops

- Seed a small grain or other appropriate crop immediately after harvest of the special crop, using a reduced seeding rate.
- No fall tillage should be conducted on land seeded to a cover crop.

2. Field Size and Orientation

Large open fields should be avoided. Field width and size should be altered where necessary to obtain longer and narrower fields. Fields should be laid out so that the longest sides are perpendicular to spring winds (figure 1).

(a) Field Shelterbelts

- use recommended tree species for Manitoba conditions, with tree spacing of 3-8 feet.
- distance between belts should be approximately 1/8th of a mile (660 ft.), and accommodate field equipment.

(b) Annual Wind Barriers

- Corn and sunflowers are suitable crops, using normal seeding rates and dates of seeding.
- Recommended barrier width and spacing is 5-12 ft. and 60 ft. respectively. Spacing should accommodate row crop equipment.

(c) Strip Cropping

- alternate strips of cereals with special crops
- there should be at least 4 strips per half mile (660 ft. width) on soils of moderate risk, and 8 strips per half mile (330 ft. width) on soils of high risk
- strips should be oriented perpendicular to spring winds (figure 1).

(d) Contour Strip Cropping

This is the practice of growing high residue crops or forages in alternate strips with special crops across the slope (contour) to reduce erosion.

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- On soils of moderate water erosion risk, characterized by landscapes of 2-5% slopes, contour strip cropping is recommended.
- Strips should be no wider than approximately 250 feet, taking into account field conditions and machinery.
- On soils of high water erosion risk, characterized by landscapes with slopes of 5-9%, it is suggested that special crops not be grown.
- If special crops are grown in areas of high water erosion risk, contour strip cropping is recommended with strips being approximately 150 feet in width.

3. Handling Pulse Residue

- Distribute pulse residues evenly over the field at harvest.
- There should be no fall tillage of pulse crops.
- Rotary combines and straw chopper attachments pulverize residues excessively.

4. Handling Potato Residue

- Attach a vine chopper to a potato harvester to eliminate the need for discing to anchor vines in the fall.
- If a vine chopper is not available, then anchor vines with a disc type implement with two thirds of the discs removed.

V. SOIL MANAGEMENT GUIDELINES FOR ORGANIC SOILS

On organic soils, wind and water erosion can be controlled under all cropping situations using the general guidelines, tillage guidelines, and conservation practices for special crop production that apply to soils with High Erosion Risk.

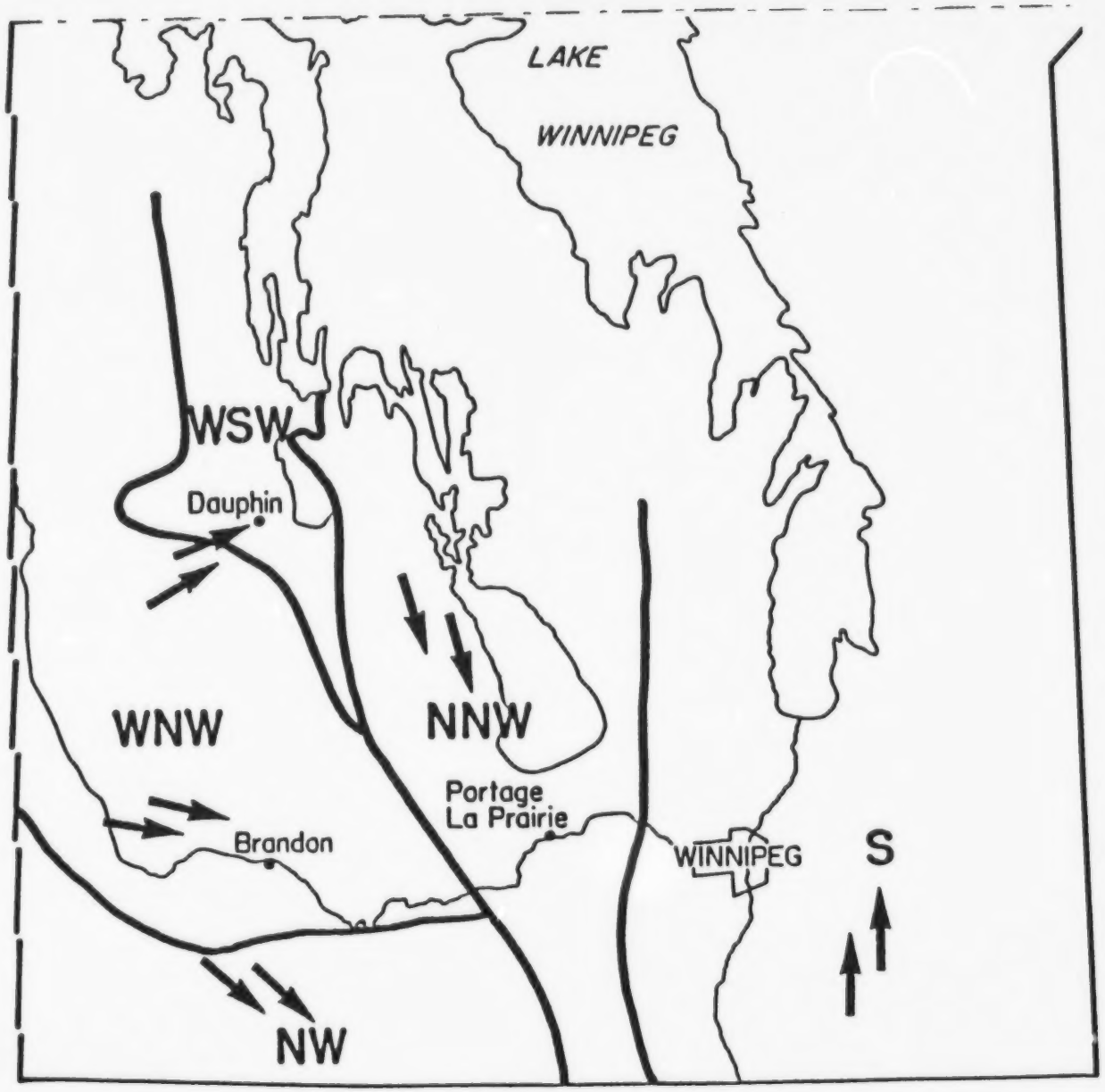

Figure 1. Prevailing Spring Wind Directions

TABLE 1 TILLAGE GUIDELINES FOR SOILS WITH SLIGHT TO MODERATE EROSION RISK

HIGH RESIDUE CROPS

CROP & YIELD (BU/AC)		
WHEAT >40 OATS >100 BARLEY >80 RYE >40	WHEAT 20-40 OATS 60-100 BARLEY 40-80 RYE 20-40	WHEAT <20 OATS <60 BARLEY <40 RYE <20
TILLAGE OPERATIONS NOT TO EXCEED		
4 CULTIVATOR OR 1 TANDEM DISC PLUS 1 CULTIVATOR	3 CULTIVATOR OR 1 TANDEM DISC IN FALL PLUS 1 CULTIVATOR IN SPRING	1 CULTIVATOR IN FALL PLUS 1 CULTIVATOR IN SPRING
CROP & YIELD (BU/AC)		
CANOLA >40	CANOLA 20-40	CANOLA <20
TILLAGE OPERATIONS NOT TO EXCEED		
3 CULTIVATOR OR 1 TANDEM DISC PLUS 1 CULTIVATOR	2 CULTIVATOR	1 CULTIVATOR
CROP & YIELD (BU/AC)		
GRAIN CORN >80	GRAIN CORN 40-80	GRAIN CORN <40
TILLAGE OPERATIONS NOT TO EXCEED		
2 CULTIVATOR IN FALL PLUS 1 CULTIVATOR IN SPRING;OR 1 CULTIVATOR IN FALL PLUS 1 TANDEM DISC IN SPRING	2 CULTIVATOR OR 1 TANDEM DISC	1 CULTIVATOR OR NO FALL TILLAGE 1 TANDEM DISC IN SPRING
CROP & YIELD (BU/AC)		
SUNFLOWERS - ALL YIELDS		
TILLAGE OPERATIONS NOT TO EXCEED		
NO FALL TILLAGE; 1 TANDEM DISC IN SPRING		

LOW RESIDUE CROPS

CROP & YIELD (BU/AC)		
FLAX >30	FLAX 15-30	FLAX <15
RESIDUE REMOVED - TILLAGE OPERATIONS NOT TO EXCEED		
1 CULTIVATOR	1 CULTIVATOR	NO FALL TILLAGE; 1 CULTIVATOR IN SPRING
RESIDUE NOT REMOVED - TILLAGE OPERATIONS NOT TO EXCEED		
3 CULTIVATOR OR 1 CULTIVATOR PLUS 1 TANDEM DISC	2 CULTIVATOR OR 1 TANDEM DISC	1 CULTIVATOR
CROP & YIELD (BU/AC)		
SILAGE CORN - ALL YIELDS		
TILLAGE OPERATIONS NOT TO EXCEED		
NO FALL TILLAGE; 1 TANDEM DISC IN SPRING		

* When cereal straw is removed by baleing the number of tillage operations should be reduced by one half.

* Where fall tillage is not recommended, anhydrous ammonia may be applied using a knife-type implement or Noble Blade.

TABLE 2 TILLAGE GUIDELINES FOR SOILS WITH HIGH EROSION RISK

HIGH RESIDUE CROPS

CROP & YIELD (BU/AC)		
WHEAT >40 OATS >100 BARLEY >80 RYE >40	WHEAT 20-40 OATS 60-100 BARLEY 40-80 RYE 20-40	WHEAT <20 OATS <60 BARLEY <40 RYE <20
TILLAGE OPERATIONS NOT TO EXCEED		
3 CULTIVATOR OR 1 TANDEM DISC IN FALL PLUS 1 CULTIVATOR IN SPRING	2 CULTIVATOR	NO FALL TILLAGE 1 CULTIVATOR IN SPRING
CROP & YIELD (BU/AC)		
CANOLA >40	CANOLA 20-40	CANOLA <20
TILLAGE OPERATIONS NOT TO EXCEED		
2 CULTIVATOR	1 CULTIVATOR	NO FALL TILLAGE; 1 CULTIVATOR IN SPRING
CROP & YIELD (BU/AC)		
GRAIN CORN >80	GRAIN CORN 40-80	GRAIN CORN <40
TILLAGE OPERATIONS NOT TO EXCEED		
2 CULTIVATOR OR 1 TANDEM DISC	1 CULTIVATOR OR 1 TANDEM DISC IN SPRING	NO FALL TILLAGE; 1 TANDEM DISC IN SPRING
CROP & YIELD (BU/AC)		
SUNFLOWERS - ALL YIELDS		
TILLAGE OPERATIONS NOT TO EXCEED		
NO FALL TILLAGE; 1 TANDEM DISC IN SPRING		

LOW RESIDUE CROPS

CROP & YIELD (BU/AC)		
FLAX >30	FLAX 15-30	FLAX <15
RESIDUE REMOVED - TILLAGE OPERATIONS NOT TO EXCEED		
NO FALL TILLAGE; 1 CULTIVATOR IN SPRING		
RESIDUE NOT REMOVED - TILLAGE OPERATIONS NOT TO EXCEED		
1 CULTIVATOR	NO FALL TILLAGE; 1 CULTIVATOR IN SPRING	NO FALL TILLAGE; 1 CULTIVATOR IN SPRING
CROP & YIELD (BU/AC)		
SILAGE CORN - ALL YIELDS		
TILLAGE OPERATIONS NOT TO EXCEED		
NO FALL TILLAGE; 1 TANDEM DISC IN SPRING		

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* Where fall tillage is not recommended, anhydrous ammonia may be applied using a knife-type implement or Noble Blade.